

NOVA SCOTIA GOLD FIELDS.



SEA LEVEL

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The line along which the section is made out, extends from the sea shore at the south-east entrance of Halifax Harbor, to the Renfrew Gold Field, a distance a little over thirty miles, intersecting, in that distance, no less than six great anticlinal folds.

Horizontal Section of the Strath

Blue and Grey Slate

Black Rock

Blue and Grey Slate

LOWER CLAY SLATE GROUP.

Quartzite Group

Tangier Gold Field

Wine Harbour Gold Field.
Lawrencetown do. do.

Atlantic

SE

our Gold Field.
own do. do.

Sherbrooke Gold Field
Old Tangier do. do.
Birch Cove do. do.



SECTION,—ACROSS THE GOLD BEARING ROCKS OF THE
D I S T A N C E 55

Affording a General View of the Arrangement and Relative P

Waverly Gold Field.
Isaacs Harbour do.

Oldham Gold Field.
Country Harbour do.



OF THE ATLANTIC COAST OF NOVA SCOTIA,

55 MILES

1 Relative Position of the Different Groups of Strata.

Field .
our do.

Renfrew Gold Field.

SEA LEVEL.



To the Hon.

Sir,

I have the information report of a section of the Cape Breton

In my report the Gold Field endeavored to of structure which may be carefully observed fully impress structure of the ment of its in- intimately con- veins and other of its strata.

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Knowledge of rocks of the south in every part of since gold, in the group, and to the

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NOVA SCOTIA GOLD FIELDS.

MR. CAMPBELL'S REPORT.

Halifax, Nova Scotia, 25th February, 1863.

To the Honorable JOSEPH HOWE,
Provincial Secretary.

SIR,—

I have the honor to submit, in accordance with your instructions, for the information of His Excellency the Lieutenant-Governor, the following report of a mineralogical exploration of certain districts in the eastern section of the Province, including the Cape North district in the Island of Cape Breton:

In my report of some explorations made during the autumn of 1861, in the Gold Fields on the southern or Atlantic coast of the Province, I endeavored to bring to notice, as prominently as possible, certain conditions of structure or arrangement of the rocks occupying the southern coast, which may serve as an excellent guide in the exploration of the country, if carefully observed. I deemed it important that this should be done, being fully impressed with the conviction that some knowledge of the geological structure of the country is necessary to the successful and rapid development of its mineral wealth; for no other point of its natural history is more intimately connected, with the formation and distribution of metalliferous veins and other mineral deposits, than the structure or peculiar arrangement of its strata. In all vertical sections hitherto made out across the rocks of the south or Atlantic coast of the Province, but one line of elevation or anticlinal axis is represented, along the centre of a band of strata over thirty miles in breadth.

If this has, in reality, been the stratigraphical arrangement in the south coast band, there would exist but a poor chance of many of its older strata being brought to the surface in lines of upheaval, along the north coast of the Province, where so great an accumulation of newer schistose rocks and carboniferous rocks has taken place; for such an arrangement as one line of elevation in such a broad band of strata, dipping at an angle of sixty degrees on an average, would necessarily imply a vertical thickness of ten miles, at least, of beds.

As it is, however, scarcely two miles, in vertical thickness, of beds are brought in section to the surface; for they are brought up in six different lines of elevation, or anticlinal axis, instead of one.

By referring to the section appended to this report, it will be observed that the clay slate is superimposed on the quartzite as a distinct group, and not interstratified with it in occasional bands as is generally supposed.

The quartzite should be regarded, therefore, as a distinct group also, being the oldest and thickest group of stratified rocks in the Province.

Knowledge of these facts clears away much of the confusion in which the rocks of the south coast seem involved, and it renders exploration for gold, in every part of the Province, much easier and far more certain of success, since gold, in this country, appears to be mainly confined to the quartzite group, and to the lowest members of the clay slate group.

The line along which the section is made out, extends from the sea shore at the south-east entrance of Halifax Harbor, to the Renfrew Gold Field, a distance a little over thirty miles, intersecting, in that distance, no less than six great anticlinal folds.

Those folds, or lines of elevation, run nearly parallel with each other, from the extreme western coast of the Province to the sea shore between Cape Canso and Liscomb Harbor, where they pass beneath the sea. This is owing to a curving of their course, or strike from east and west to south sixty degrees east. In the western section of the Province they also curve considerably to the south-westward.

It will be observed that they do not lie at equal distances apart, which is due, no doubt, to the fact of the strata being folded up to sharper angles of inclination, or dip, in some of them. This is more particularly noticeable in the second line from the sea shore, that passing through Citadel Hill.

Whether the strata were folded in this manner previous to their being hardened, or solidified, and whether a long period of time was occupied in the process of folding, are important questions, but not easily solved. The evidence, however, seems to preponderate in favor of the supposition that they were folded while undergoing the process of consolidation; and hence the formation of planes of slaty cleavage, and the peculiar grain or reed impressed on the strata, parallel to the direction of the axes of the folds. There is evidence also to show that these impressions were produced in lines horizontal in the direction of the axes of the folds.

This is made sufficiently clear by the exact correspondence of the angle of dip of the fibrous grain with the angle of dip of the arched strata, in the crown of the axes of east and west lines of elevation, where they were broken transversely, and upheaved by north and south lines of disturbance.

Indeed it is mainly by observing the direction in which this fibrous grain of the rocks incline, that the existence and position of transverse, or north and south lines of upheaval, can be made out, when the exposures in which the observations are to be made do not happen to be exactly on the axes of the folds; and the chances of finding such exposures along the axes of the lines of upheaval very seldom occur, because the greater part of the surface of the country is covered by drift.

To find the exact points at which the east and west anticlinal lines are intersected by north and south lines of upheaval, is of the utmost importance, for it is chiefly at such localities that gold-bearing rocks are brought to the surface. This fact is worthy of particular notice, for it indicates, unmistakably, that gold is most abundant in the quartzite group, and in the passage beds from it to the clay slate group. Nor is that the only point, in this connection, deserving the most careful attention; for if it is true that gold is most abundant in a zone lying at a great depth from what was the original surface of the clay slate group, previous to their being upheaved, transversely to the east and west parallel folds, and denuded, it follows that, from the axes of north and south lines of elevation, that zone will be found dipping at the same angle as the grain of the rock, either to the eastward or westward.

Therefore the angle at which it must be followed, by drifting, is measurable, and the depth at which it can be reached, at any given distance from the axes of the transverse lines of elevation, is measurable also by carefully observing the angle at which the grain of the rock dips.

The extent of denudation of strata of the clay slate and quartzite groups, in some localities, cannot be estimated at much below a mile and a-half of vertical depth; one-third part, at least, of this depth may be regarded as poor in gold-bearing quartz.

There must, therefore, be extensive areas between the north and south lines of elevation, comparatively poor in gold. Those barren areas may be almost always known by a greater breadth of the surface being found occupied by clay slate, between the east and west anticlinal lines; and when gold occurs, at all, in areas chiefly occupied by the clay slate group, it is necessarily confined to a narrow belt along the east and west anticlinal lines. There is an instance of this at the Ovens Gold Field.

As regards the gold removed from the rocks by denudation, and dispersed through the resulting detritus, it is possible that much of it may yet be discovered, if proper search is made for it, in the direction in which it was removed from its matrix.

In this country the direction of the denuding force appears to have been from N. 15° W. to S. 15° E. as a mean; there being slight deflections from this course observable in some districts.

That the principal part of this abrasion occurred during the drift, or glacial period, does not admit of a doubt; therefore all the gold removed from the rocks must lie somewhere in the direction in which the glacier moved; and this direction can be ascertained, for any particular locality, by observing the direction of, the polished grooves and scratches on the surface of the rock in place.

In nearly all deposits of glacial drift, or boulder clay, on the south coast, more or less gold is found; but its economical value is much lessened by its dissemination through tenacious clay—too expensive to work by ordinary means. It is only where the glacial drift has been rearranged that gold can be found sufficiently concentrated to make it worth working.

The close vicinage to the sea of the gold-bearing rocks of the south coast, renders it most likely that the greater part of the gold removed from the rocks by glacial action, is now dispersed through the submarine banks skirting the southern coast of the Province. Perhaps this is proved sufficiently clear by the fact of gold being largely disseminated through the sands of Sable Island, the only point of those banks above the surface of the sea.

In the northern districts, it is most likely that the greater part of the gold liberated may still be found in the drift lying to the southward of those districts; and its presence in the sands of many of the rivers and brooks in the interior, and along the northern coast of the Province, may be regarded as reliable indications of its existence in some of those localities, both in the rocks and in the glacial drift. Those streams, in the greater part of their course, pass over carboniferous and silurian rocks, in which I failed to discover the existence of any gold; and not having sufficient time for examining the high lands in which they take their rise, I was unable to discover the source from which they obtained it. That they carry it in their drift, from areas in which auriferous strata of the older clay slate and quartzite groups are brought to the surface, is most likely; and that it is obtained there, both from auriferous quartz veins and from glacial deposits, is also likely; but to explore thoroughly the whole of those extensive areas, much time, and most careful observation, will be required.

Winter having put a stop to exploration in 1861, before I had an opportunity of examining the Gold Districts of Waverley, Oldham and Renfrew, I therefore made a hurried exploration of these localities in the early part of the past summer.

The Waverley Gold District, I find, is located on a broad waved anticlinal, with strike nearly east and west. The strata in which the auriferous quartz beds or seams occur, belong to the quartzite groups, and lie in that formation at the vertical depth of little over half a mile below the base of the clay slate group. In the crown of the arch they have an inclination or dip to the westward of one foot in ten, being raised to that angle by a north and south line of disturbance, which lies some distance to the eastward.

But this may not be the angle of inclination of the grain of the rock, and of strata in the crown of the axis of the east and west fold, in every part of this Gold Field. For, in the neighborhood of north and south lines of upheaval generally, dislocations and shiftings, or faults, are of frequent occurrence, often either increasing or diminishing the angle of inclination of the grain of the rock in different sections of the field; thus displacing the east and west quartz veins, in many instances.

Such lines of dislocation are usually found occupied by quartz veins which yield little or no gold, even where it is most abundant in those running east and west, in the planes of bedding of the rock.

Those cross courses cut and sometimes shift the east and west veins in such a manner as to show clearly that they were formed at a much later

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period than the east and west veins; and it shows also that the strata which they traverse were solidified, and, to some extent, metamorphosed, previous to their formation.

That the east and west quartz veins were formed at a much earlier period of time than the cross courses, is still further shown by the manner in which they have moulded places for themselves in the strata which enclose them.

The convoluted, or rolled form, which they are sometimes found to have assumed, shows unmistakably that the strata were not altogether solidified when the veins were formed. It appears, indeed, very probable that the east and west veins were formed while the strata were sufficiently plastic to yield and bend without breaking.

We find here additional evidence to show that the upheaving of the strata, along east and west anticlinal lines, resulted from the first class of disturbance to which they were subjected, and that the north and south lines of upheaval were produced at a subsequent period by a second class of disturbing forces.

That the first class of disturbing forces continued in active operation up to the close of the carboniferous period, is clearly shown by the manner in which the strata of that age are folded up in the synclinal folds of the older rocks and mainly conformable with them in their bedding. But the second class of disturbing agencies appears to have been most active after the close of the carboniferous period.

In the way of exploration, much remains yet to be done in the Waverley Gold Field, particularly in the west end of it; nor is it unlikely that rich deposits of gold exists in the drift lying to the south-eastward of it.

To the northward of this Gold District, at a distance of five and a half, or six miles, after passing over a trough partly filled up by members of the clay slate group, we come to another great anticlinal fold in the quartzite group, on which, at a distance of two miles east from Grand Lake, the gold mining district of Oldham is located.

The great depth at which the gold bearing strata of this field lie, in that group, is clearly seen in the section shown by the railway cutting. It can not be much short of half a mile of vertical depth.

All the mines that have been opened in this district are ranged along a deep narrow valley, which extends for some distance in the anticlinal axis of the field, as if a wide chasm had originally been formed along the line of upheaval. Should this, on further examination, prove to be the case, extraordinary deposits may be expected towards the bottom of this fissure; and shafts should be sunk there for the purpose of exploring it. Quartz veins seem quite abundant; and some of them are of large size, and apparently rich in gold.

The prospects, upon the whole, appear quite favorable; and, no doubt, when the geological peculiarities of the district are better understood, it will prove an important mining locality.

I made some explorations to the west of Grand Lake, along the Oldham metalliferous band, and found traces of gold in the sands of a small stream, which, I believe, is locally named the Beaver Dam River.

This region is, no doubt, worthy of more extended search than I was at the time able to make; for the surface indications appear to be of a very favorable character.

Proceeding northward on the Beaver Bank road, another belt of clay slate is crossed before reaching the metalliferous line of elevation on which the Renfrew gold field is situated. This belt occupies the synclinal valley between the Oldham and Renfrew anticlinal folds.

I obtained gold from fissures in this slate, and from patches of rusty looking soil on its surface; but since no quartz veins appear to exist in the slate itself, it is most likely that this gold was removed by glacial action from the Renfrew band, which lies to the northward.

Explorers for gold should give this district a thorough examination, by sinking pits down to the bed rock, in the most likely places; for there is

no reason to doubt that some gold lies below the glacial drift deposited in depressions and chasms in the bed rock, even if it should not be found in the drift itself in sufficiently large quantity to pay the working.

Extensive mining operations are in progress at Renfrew, attended by the most encouraging results. Gold is so abundant, in some of the veins, that it is difficult to find a piece of quartz, a few cubic inches in size, that does not contain more or less gold; indeed, some of the quartz is so rich, that scarcely a piece, even one cubic inch in size, can be found that does not contain gold.

The yield, per ton, of such quartz, when crushed, cannot fail to prove highly satisfactory.

Mining is limited, as yet, to the south dip of the band, the strata on the north dip being covered by a considerable depth of drift from the newer group of clay slates, or upper silurian rocks, lying within a short distance of this band to the northward. That quartz veins will be found on the north side of the axis as rich as those on the south side of it, is highly probable; and efforts should therefore be made for its early exploration.

I examined a section across this metalliferous band, at a point about ten miles to the west of the Renfrew district, where the River Hebert cuts obliquely across it. This stream is a tributary of the St. Croix; it passes through a rich agricultural district, and rolls gold in its sands along the greater part of its course. In all trials made on this stream, I found from one to five pieces of gold to the panful of stuff; and other parties who were assisting me in making the search were nearly as successful.

Quartz rock is very abundant in the neighborhood. On one farm, in particular, I observed a section of over two hundred feet of a massive stone wall, all composed of good looking quartz, enclosing a large field, in which also great quantities of quartz appear cropping through the surface.

This quartz does not seem to contain much gold; for, in a search extending over two hours, I did not succeed in finding but one small spec of the metal. But in a place like this, where many thousands of tons of the rock can be got ready quarried for the crusher, and where an inexhaustible supply exists, in a district easily mined, even a small per centage to the ton should make it a valuable field for gold mining.

The inducement to try the experiment of putting an exploring shaft down to the depth of, say, four hundred feet, is greater here than in any other place I know; for the geology of the district is of such a character as to render it more than probable that the quartz will be found much richer in gold at some considerable depth *below* the surface,—for there it presents but slight traces of the metal.

Perhaps some of the associations, already organized for gold mining, would find it much to their advantage to give this locality a fair trial. Its close vicinity to good water power, on the River Hebert, adds much to its value.

Extending my researches along this range to a distance of seven or eight miles further to the westward, I observed another spot where, there is reason to believe, extensive operations might be profitably carried on in quartz crushing.

In this locality also the quartz is very abundant at and near the surface, and it appears to be of good quality. One vein, of large size, is exposed for several hundred yards along the bed of a brook, and thousands of tons from the same vein lie as loose boulders near its outcrop.

This locality is about nine miles from Windsor, and one and a half to the eastward from the post-road leading from Windsor to Halifax.

To ascertain by trial, on a large scale, the value of this quartz, and of that in the township of Rawdon, would be very desirable; for there are several localities in which it can be obtained in great quantities in rocks of the same age, viz.: the upper members of the older clay slate group, and lower members of the newer group of argillaceous schists.

On the high range of land, forming the north side of the valley of the Upper Musquodoboit River, it exists in great abundance in many places

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where it can be mined at a small cost, and in the vicinity of good water power.

Under these circumstances, quartz, comparatively poor in gold, might be worked profitably on a large scale. As yet, however, no positive or satisfactory evidence has been obtained to show that gold in paying quantities, exists in quartz of the upper clay slate group.

Although we find gold in several streams draining districts chiefly occupied by rocks of this age, it cannot be regarded as sufficient evidence; since it is possible that the gold rolled in the sands of these streams may have been derived from the older rocks, brought to the surface in the high lands in which they take their rise.

I have proved the drift of the Stewiacke River to be auriferous, by many trials made along its course, for a distance of fifteen miles. The quantity obtained on each trial, ranged from one to as much as thirty-eight specks to the pan full. This proves the existence of gold, in considerable quantities, in the valley of this stream.

But, as far as I have been able to examine along its course, no rocks in place are found of greater age than the upper clay slate group.

In a section of several miles, near its head waters, the main stream runs in an easterly direction, along a synclinal valley in the upper clay slates. Here it sends branches of considerable size to the northward across strata dipping at sharp angles to the south.

I followed one of those streams—named Sutherland's Brook—for a distance of three miles, which would make about two miles of section across strata with continual southerly dip, at an angle of 50° and 60° . The strata forming the north end of the section, I found to be upper members of the lower, or older clay slate group; and if I had been able to follow the stream farther in that direction, I have no doubt that the old gold-bearing rocks of the south coast would be found at the surface along an east and west anticlinal line. It seems, therefore, most probable that the Stewiacke derives its gold from this range of high lands, forming the watershed between it and the east branch of the Salmon River, which runs along the eastern head of the valley of the Bay of Fundy.

The whole of this region is still an unoccupied wilderness. Although the greater part of the land is well adapted for farming purposes, yet it is now frequented only by the lumberer, the bear and moose hunter.

I spent some time during the summer of 1847 in making examinations among the lower carboniferous rocks which occupy an extensive area in the northern section of this tract,—that bordering the east branch of the Salmon River, on its south side. Here a fine stream named the Calvary falls into it from the south, cutting a deep channel for itself in the rocks at right angles to their strike; thus exposing a section, some miles in extent, of lower carboniferous, or devonian rocks, and upper clay slate, or silurian rocks, all dipping at sharp angles to the northward, or contrary to the direction of dip of strata exposed in section along Sutherland's Brook.

This fact affords ample evidence to prove the existence of an east and west anticlinal line of elevation along the middle of the district, where the older slates, and probably strata of the quartzite group, are brought to the surface. Hence, no doubt, its auriferous character, as indicated by the existence of the gold in the sands of the streams that traverse it.

To explore this district thoroughly would occupy at least two or three months. What has been accomplished in the short time I was able to devote to that object, was merely to expose a few links of a chain which will, no doubt, lead to more valuable discoveries, if carefully followed up, a task which I had to abandon, though very reluctantly, and proceed to the eastward to explore the Cape North district, in the Island of Cape Breton.

While on my way to that place, I examined a few points along the road, in which I observed favorable indications of the existence of gold. French River, a small stream which falls into Merigomish Harbor, was the first that I examined, and found gold in its drift, which there is reason to believe it derives from auriferous quartz veins in the Blue Mountain, a range of highlands in which it takes its rise.

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I found gold also disseminated through gravel banks, at various levels above the bed of the river, and observed detritus from quartz veins abundant in the gravel banks, and in the bed of the stream.

The second place examined was the Milford River, which falls into Milford Haven, at the head of Chedabucto Bay. From the result of a few trials made here, I infer the existence of gold somewhere in the mountains drained in this stream; and there is reason to believe that it will be found also largely disseminated through that extensive tract of alluvial deposits, known as the Milford Haven Intervale. It was late in the evening when I reached that place, so I had only time to wash three pans full of stuff, in each of which I found from two to three pieces of gold. This was obtained from surface stuff, dug out from among the roots of the grass. It is probable, therefore, that gold in much larger quantities may be found at a greater depth.

I observed traces of gold also in some quartz boulders, in the township of Manchester, about three miles to the eastward of Milford Haven. This quartz was probably drifted from the slate hills to the north, for the district in which they occur is occupied by carboniferous rocks.

I made several trials after this along the road, for a distance of thirty miles, without any favorable results, until I reached the principal streams falling into the Gulf of St. Lawrence between the Strait of Canso and Port Hood.

Two of these streams roll gold in their sands, which they, no doubt, derived from metalliferous lodes at their sources, in the high range of mountains extending eastward from Cape Porcupine.

I could not spare time for an extended search, but feel confident from what I have observed, that rich deposits of the metal may be discovered in the mountains at the head waters of Long Point River, in particular, for every trial made on this stream yielded from three to four sights in every pan full of sand. From Port Hood to the River Margaree, a distance of forty miles, the country presents very little to encourage exploration for gold, being principally occupied by carboniferous rocks. But the region lying to the eastward of the Margaree, comprising the Cape North district, presents great inducements for exploration for the precious metals. The country is much more varied in its mineralogical and geological characters, and it has been subjected to metamorphic action of much greater intensity apparently than any other section of the Province. Several of the streams which drain this extensive region, roll gold in their drift to the sea; but of the character of the country in which they take their rise very little is known. The sources of some of them are even yet enveloped in as much mystery almost as the sources of the Nile. This is partly owing to the fact of the country being still in the wilderness state. But the greatest difficulty, in the way of exploring it, is the extraordinary depth of the defiles, or narrow valleys, in which most of the streams flow from the interior, and the exceeding steepness of the slopes that wall them in on both sides.

The explorer is compelled to travel either in the bed of the stream, all the way, or along the top of the slopes, at an altitude of ten or twelve hundred feet above it. In the latter case he could learn but very little of the mineral character or geology of the country, for its surface is generally found covered, to a considerable depth by soil, in which but few stones are met with, and the rock is seldom found exposed at the surface, even in the slopes, although they are generally found ranging from an angle of sixty to seventy degrees of inclination.

It is mainly by wading along the channels of its rivers that the greater part of this country can, therefore, be explored.

Another great obstacle to exploring this country is the dense growth of luxuriant forest that everywhere covers the slopes and glens, and even the greater part of the table lands, or tops of the mountains; for, in its general topographical features, the Cape North district may be regarded as an elevated plateau, having a main altitude of twelve hundred feet above the level of the sea.

To the Gulf of St. Lawrence, on its north-west side, it presents a bold front of rounded or conical mountains, united at their base, and appearing like buttresses supporting the table lands of the interior on their flanks. They attain, at some points, an elevation of fifteen hundred feet above the sea level; and their general outline is softened and the landscape rendered beautiful by a dense covering of hardwood forest, by which they are clothed from their base to their summits.

The greater part of the district is encircled by a rampart of similar mountains, more or less rounded in their contour; and where they happen to be stripped of their covering of forest, by the ravages of fire, they appear as naked cones of crumbly red feldspar rock, which is the prevailing igneous rock of the district, and that from which the principal part of the soil is derived. Hence, no doubt, its extraordinary fertility.

Viewed from the interior, these mountains appear but little elevated above the general level of the country, which in its main aspects appears comparatively level, although cut by deep valleys and narrow defiles along all its water courses.

Wherever bottom-lands, or intervale, occurs in the valleys, the soil is remarkably rich. This is evident from the heavy growth of healthy looking timber they produce, consisting principally of maple, birch, beech and elm, with occasional oak trees of large size, and well adapted for staves or ship timber.

I observed some elm trees as much as four feet diameter, and as straight and tall as any I ever saw in the forests of Canada, or the South-western States.

Most of the steep slopes are also heavily timbered; but on the table lands the forest is much lighter, and chiefly composed of spruce, fir and hardwood mixed. The soil generally appears to be good, and comparatively free from stones.

Considerable tracts of the higher or table lands are occupied by peat bogs, which will, no doubt, some time hereafter, prove of great value, as they are capable of yielding an unlimited supply of that description of fuel, of the finest quality.

The surface of these peat bogs presents the appearance of gently sloping planes of elliptic form, having deep circular basins at their highest points, full to their brim of clear, icy cold water. These basins are no doubt fed by springs from below, and they appear indispensable to the accumulation of any great depth of peat free from earthy matter.

The geology of this district bears a very close resemblance to that of the Cobequid Mountains; but the brown feldspar rock, or syenite, which is here the predominant intrusive rock, differs from syenite in the Cobequid Mountains, in having much less quartz and hornblende in its composition, and it is of a more crumbly and perishable nature. On this account the soil of the district is chiefly composed of it.

The other intrusive rocks are occasional dikes of porphyry and trap; true granite being very scarce if at all present. The prevailing stratified rocks are the newer clay slate, or upper silurian rocks, and devonian, or lower carboniferous rocks—all metamorphosed to a higher degree, and much more disturbed by igneous masses and dikes, than is observed in any other section of the Province.

To make out the geological structure of the district on the large scale is not, however, a very difficult task, because extensive sections of the rocks are exposed along the sea shore, and in the channels of some of the rivers. The same general arrangement of the strata in parallel folds, appears to be the most important feature of its structure; but the strike of the rock inclines more to the northward and southward than I observed any where else—being N. 20° E., S. 20° W.; as a general rule the greatest amount of inclination I observed was, N. 15° E., S. 15° W. This brings the strata obliquely to the Gulf Coast line, which has a general course of about No. 40° E., S. 40° W., affording an excellent opportunity for observing the phenomena presented by the different groups along their lines of contact.

To give, however, anything like a detailed description of the geology of a country so little explored, would be premature; more extended research and very careful examination, would be necessary, before such a thing should be attempted.

The result of my observations in this district inclines me to adopt the opinion that gold is chiefly confined to the south-western half of it. The sands of all streams draining that section are more or less auriferous; but I failed to discover any gold in the sands of streams traversing the other section.

That the streams which carry gold in their drift remove it from more ancient rocks, in the interior of the country, than any exposed in place along the sections of their course that I have been able to examine, is most likely, for the greater part of their drift is composed of detritus of the older rocks.

The Margaree rolls gold in its sands over a bed of carboniferous rocks, a distance of twenty miles, or more; yet the greater part of its drift consists of materials derived from older formations. The Bedeque and Middle River, also, which take their rise in the same region, carry a heavy drift of ancient detritus, in which gold is largely disseminated, for fifteen or twenty miles, along valleys scooped out in carboniferous rocks.

The main course of those rivers is from north-east to south-west. In the lower part of their course they flow through broad, rich valleys, along which highly prosperous settlements extend far in among the mountains. They discharge a considerable volume of clear, cold water, over pebbly beds of an average breadth of seventy or eighty feet, with a fall of about one foot in three hundred. As might be expected, the gold is not altogether confined to the channels which the streams now occupy, but is dispersed through the whole of the bottom lands, or alluvial deposits, on each side of the streams.

All the trials I made were in surface stuff; but the results were of such a character as to leave no room to doubt the existence of gold in large quantities, in some places at the base of the alluvial drift, in those river valleys.

I found gold in every trial made on those streams. On the Margaree the quantity ranged from one to six pieces to the pan full of sand; and on the Middle River, from one to seven. The pan used would contain about two quarts when full. This may help to convey a pretty fair idea of the quantity of gold dispersed through the alluvial drift, to those accustomed to searching for gold in river sands. It is true that many trials might be made in the sands of those rivers without finding a single spec of gold, if the most likely spots, accessible at the surface of the drift, were not selected for making such trials.

But it is well known to all who have had any experience in such work, that this can be done even on the richest gold-bearing streams in any country.

To cut trenches down to the base of the drift, where I would expect to find the gold most abundant, would require more time than I had at my disposal when there; so I had to confine my operations to surface deposits alone. In view of all the circumstances, I have no doubt that gold washings on the north-east branch of the Margaree River, and on the Wagamatcook, or Middle River, will prove remunerative, if the works are conducted skilfully.

Nor is there any reason to doubt that valuable gold mines exist somewhere at the head waters of those streams. No time should therefore be allowed to pass without having a thorough exploration made in the region in which they take their rise.

There are three other streams that have their sources in the same region, and they also carry gold in their drift, derived, in all probability, from the district in which they take their rise. The first of these discharges its waters into the Gulf, a short distance westward from Cheticamp. Within a few hundred yards of it, stands a spacious new building, designed for a place of worship for the French Roman Catholics, who are the principal inhabitants of this part of the coast. As a chapel, it is not surpassed by any edi-

fice of the kind in the Lower Provinces. It is altogether built of freestone, in the old English Gothic style of architecture. It reflects much credit on all concerned, both in its design and execution, and is certainly an ornament to the beautiful country that surrounds it. In this river I succeeded in finding only ten pieces of gold in fifteen pans full of sand which I washed; but I have reason to believe that it is more plentiful higher up the stream. I observed boulders of vesicular trap, or lava very abundant in the drift of this stream, which indicates volcanic action to some extent in the interior at a former period, and it goes far also to confirm the belief that valuable minerals abound in this region, especially gold, silver and copper ores.

Steep Mountain River is the second stream met with after passing the Margaree. It falls into the Gulf at a point six or seven miles past Cheticamp to the eastward. It is locally known to some as Little River; but this is a misnomer, for it is much the largest stream east of the Margaree.

Gold seems to be quite plentiful in the drift of this river, for it appeared in every trial made in its sands during a whole day's operation; and as much as five, and often seven pieces appeared frequently as the result of a trial. The gold is coarser, and more plentiful the higher up the stream is followed towards its headwater.

I followed it only as far as I could in one day's journey, returning in time to reach the Gulf Shore about midnight, as I had no provision then made to enable me to camp in the forest. I found it impossible to ascend this river otherwise than by travelling in its channel; for the land rises steeply on each side to a height of ten and twelve hundred feet above its bed. The whole of the country, as far as I could see on each side of the river, appears to be cut, by deep defiles, into a succession of rounded mountains, with their sides sloping at an angle seldom found less than sixty or seventy degrees; and they are also covered by a dense forest which greatly increases the difficulty of travelling along the banks of the river.

The channel of this stream is about one hundred and fifty feet wide, and paved by well rounded boulders and coarse gravel, consisting of detritus, chiefly from clay slates, porphyry, and svenite, with occasional masses and pebbles of quartz rock. During floods, the water rises in this broad channel to as much as fifteen feet, sometimes, above its ordinary level; but during the greater part of the summer season, more than half its channel is quite dry, so that there will be no difficulty in obtaining the gold from its channel, should it prove sufficiently abundant.

The third gold bearing stream alluded to, falls into the Gulf about eight miles beyond the Steep Mountain River, and fourteen or fifteen miles north eastward from Cheticamp. This stream also is known by two names: some call it Lazar River, and others maintain that its proper name is Red Point River. I made but few trials on this stream, but every pan full of stuff washed showed more or less gold. It is but a small stream, about the same size as the stream that falls into the sea near the chapel at Cheticamp. Its channel is not much over twenty feet wide, and is fordable everywhere during the summer season.

Between Red Point River and Cape North I made diligent and careful search for some distance along the courses of four different streams of considerable size, without discovering any traces of gold.

Three of these rivers fall into the Gulf within four or five miles of each other, at Grand Ance, or Limbo Cove, as it is named on some maps of the country. The first met with, before coming to Grand Ance, is named the Fish Pond River; and the second is known as the McKenzie River; and the third is Grand Ance, or Grand Tosh River.

The fourth stream is the North River of Cape North, which, after running twenty-five or thirty miles in a north-easterly course, through a beautiful glen, discharges its waters into Aspy Bay.

I also made some search along the sea shore around Cape North, and towards Bay St. Lawrence, without meeting with any success.

But it is not at all unlikely that gold may yet be found in some parts of the north-eastern section of the Cape North district, since full nine-tenths

of its area remain yet unexplored; still, estimating its value as a mineral region by what I have already discovered within its limits, there seems to be good reasons for believing that it must ere long become the scene of important mining operations, independent of the discovery of gold.

From the mouth of Steep Mountain River, for a distance of thirty miles to the eastward, favorable indications of the existence of the ores of copper, zinc and barytes present themselves at different points.

Magnetic iron ore also seems quite abundant at some points between Grand Ance and Cape St. Lawrence. This might be turned to good account where fuel of every description can be obtained. I have no doubt that coal exists at Bay St. Lawrence, and I am informed that one bed has already been discovered there; and as for wood and peat for charcoal, the supply is unlimited.

But no mining operations, on a large scale, can be commenced in this region until a harbor of some kind is constructed. This, I have reason to believe can be easily done at Aspy Bay, where a good harbor carrying three and three and a-half fathoms water extends three miles inland from a bar which separates it from the bay, except a narrow pass of three feet most water on the bar. The shore slopes steeply outside the bar, to eight and nine fathoms, with sand and clay bottom. The distance between the points of three fathoms depth outside and inside the bar, will not much exceed three hundred yards; and the holding ground is good, for there seems to be a deep substratum of stiff boulder clay, into which piles can be driven to any depth that may be deemed necessary.

For a distance of twenty-five or thirty miles inland from this harbor, the soil is well adapted for agricultural purposes; and the facilities for lumbering and ship-building surpass those of any other district in the Province.

The cutting of a channel across this narrow bar would also give a great impulse to fishing on this part of the coast, and would be the means of saving much life and property. But apart from all other considerations, the mining interests that will be likely to spring up in this section of the Province in a short time, in connection with its silver, iron and zinc, render it necessary that the harbors should be opened with as little delay as possible; and some improvement should be made on the roads, which are now almost impassable even to a person on foot.

The prospects for silver and zinc mining appear most encouraging, over a considerable extent of the country, but more particularly so in the neighborhood of Grand Ance, where the Mackenzie River falls into the Gulf. This stream flows over a rough boulder bed about seventy or eighty feet wide, with a fall of about one foot in the hundred. It discharges a large volume of water during the summer season. It is not easily forded on this account, except when the water is at its lowest stages, and the difficulty is greatly increased by the large size of the boulders by which its bed is paved.

On each side of it, the land rises abruptly to a height of eight or ten hundred feet, except a short distance near the sea where the land slopes gently down to the shore.

Native metallic silver is found abundantly disseminated through the drift of this stream, in small grains and nuggets; and this appears to be the case along the greater part of its course, for in many trials made several miles inland, I found the silver as plentiful as I found it near the Gulf coast. Nor is there reason to doubt the existence of rich deposits in some places where circumstances favored the concentration of such particles of the drift as were of the greatest specific gravity, such as silver, &c.

The sources from which this stream derived the silver rolled in its drift are, as far as I have been able to discover,—first, from veins of a beautiful variety of spar, closely resembling meerschaum, that abound in some parts of this district. Some of these veins contain native silver, which is imbedded in strings and nests of a softish gray substance of earthy texture, much resembling the carbonate of that metal. The other source I have reason to believe is the general surface glacial drift along its banks and tributaries.

I observed here also some fine veins of zinc ore (calamine) which may be profitably mined, for some of them are of good size, being from three to nine inches in thickness, and in positions that are very favorable for mining.

There is a probability of some of them being also found near enough to the argentiferous veins to be mined in connection with them, which will save a large amount in mining operations where the veins may not be all of large size.

The rocks in this part of the country appear to be cut in all directions by mineral veins, variously composed; some of them are quite large, being as much as three feet in thickness.

Transverse sections of some of them may be seen along the coast at some points, particularly in the sea cliffs between the Fish Pond River and the mouth of the Mackenzie River, where masses of galena are found distributed through some of them; but not in sufficient quantity for mining, as far as can be seen on the surface.

But the facilities for mining are of such a favorable character that veins comparatively poor in ore might be profitably worked.

The prevailing rock here is a hard gray sandstone, either of Devonian or upper silurian age. It is highly metamorphosed, and very much disturbed by intrusive masses and dykes of syenite, and springs of highly mineralized water issue from it in some places, which fact may be regarded as an indication of the existence of extensive deposits of metallic ores.

In closing this report, I cannot but express regret at having been compelled by unfavorable weather and the lateness of the season to abandon exploring operations in this interesting locality without being able to bring my labors to a more satisfactory conclusion.

However, as much that is of a highly important character remains yet to be done in this district, particularly in connection with the discovery of silver, I trust I shall be enabled to attend to it as early in the ensuing summer as circumstances will permit.

I have the honor to be,

Sir,

Your obedient servant,

J. CAMPBELL.



